



US008804761B2

(12) **United States Patent**
Grilli et al.

(10) **Patent No.:** **US 8,804,761 B2**
(45) **Date of Patent:** **Aug. 12, 2014**

(54) **METHODS FOR SEAMLESS DELIVERY OF BROADCAST AND MULTICAST CONTENT ACROSS CELL BORDERS AND/OR BETWEEN DIFFERENT TRANSMISSION SCHEMES AND RELATED APPARATUS**

(75) Inventors: **Francesco Grilli**, San Diego, CA (US);
Alkinoos Hector Vayanos, San Diego, CA (US); **Lorenzo Casaccia**, Rome (IT)

(73) Assignee: **QUALCOMM Incorporated**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 980 days.

(21) Appl. No.: **10/922,405**

(22) Filed: **Aug. 19, 2004**

(65) **Prior Publication Data**

US 2005/0169205 A1 Aug. 4, 2005

Related U.S. Application Data

(60) Provisional application No. 60/497,457, filed on Aug. 21, 2003, provisional application No. 60/497,456, filed on Aug. 21, 2003.

(51) **Int. Cl.**

H04J 3/24 (2006.01)
H04L 1/00 (2006.01)
H03M 13/29 (2006.01)
H03M 13/37 (2006.01)
H03M 13/09 (2006.01)
H03M 13/15 (2006.01)
H03M 13/27 (2006.01)
H04L 1/18 (2006.01)

(52) **U.S. Cl.**

CPC **H04L 1/0057** (2013.01); **H04L 1/0041** (2013.01); **H03M 13/09** (2013.01); **H04L 1/0083** (2013.01); **H04L 1/0061** (2013.01); **H03M 13/2915** (2013.01); **H03M 13/1515** (2013.01); **H04L 1/0045** (2013.01); **H03M 13/2703** (2013.01); **H04L 1/18** (2013.01); **H04L 2001/0093** (2013.01); **H03M 13/373** (2013.01)
USPC **370/469**; **370/474**

(58) **Field of Classification Search**

USPC 370/394, 474-476, 465-470, 310;
455/403

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,901,307 A 2/1990 Gilhousen et al.
4,907,307 A 3/1990 Weitzler

(Continued)

FOREIGN PATENT DOCUMENTS

CN 1194748 A 9/1998
CN 1196845 A 10/1998

(Continued)

OTHER PUBLICATIONS

Qualcomm: "Transition between PtP and PtM in MBMS" 3GPP TSG-RAN2-37 Aug. 29, 2003, XP002312407.

(Continued)

Primary Examiner — Brian D Nguyen

Assistant Examiner — Roberta A Shand

(74) *Attorney, Agent, or Firm* — Jeffrey D. Jacobs

(57)

ABSTRACT

Transmission techniques are provided that improve service continuity and reduce interruptions in delivery of content that can be caused by transitions that occur when the User Equipment (UE) moves from one cell to the other, or when the delivery of content changes from a Point-to-Point (PTP) connection to a Point-to-Multipoint (PTM) connection in the same serving cell, and vice-versa. Such transmission techniques enable seamless delivery of content across cell borders and/or between different transmission schemes such as Point-to-Multipoint (PTM) and Point-to-Point (PTP). Mechanisms for adjusting different streams and for recovering content from each data block during such transitions are also provided so that data is not lost during a transition. In addition, mechanisms for realigning data during decoding at a receiving terminal are also provided.

19 Claims, 24 Drawing Sheets

Packet Switched

